

Construction noise and vibration Monthly Report – October 2020

Buckinghamshire

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Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise monitoring carried out within Buckinghamshire (BS) during the month of October 2020.

Within this period noise monitoring was undertaken in the vicinity of the following worksites:

- Bottom House Farm Lane worksite (ref.: BHFL), where earthworks, roadworks and site management activities were underway.
- Chalfont St Peter Vent Shaft worksite (ref.: CSP), where excavation works, structural concrete wall installation and concreting works were in progress.
- Load Test Pile 1 worksite (ref.: LTP #1), where ground investigation works, earthworks and roadworks were underway.
- Amersham Vent Shaft worksite (ref.: AM), where installation of service, earthworks activities and roadworks were underway.
- Quainton Access Road (ref: QAR), where earthworks and roadworks were underway.

Further works, where monitoring did not take place, were also undertaken at the following locations:

- Ground investigation works to inform design and site mobilisation at various locations within the local authority area.
- Northmoor, Chalfont St. Giles and Amersham as part of water pipeline works.
- Frith Hill, Wendover, Aylesbury, Quainton, Mixbury, Calvert, Uxbridge and Turweston as part of electricity diversion works.
- Aylesbury, Quainton, Fulmer and Perry Hill as part of gas pipeline works.
- Great Missenden, West Street compound, Quainton, Calvert and Edgcott Road where compound set up, ground investigations and earthworks were underway.

There were no exceedances of the HS2 threshold levels for significant noise impacts during the reporting period at any monitoring position.

There were no exceedances of trigger levels as defined in Section 61 consents during the reporting period at any monitoring position.

One complaint was received during the monitoring period. A description of the complaint, the results of investigations and any actions taken are detailed in Table 6 of this report.

Abbreviations and Descriptions

The abbreviations, descriptions and project terminology used within this report can be found in Table 1.

Table 1: Table of Abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$.

1 Introduction

1.1.1 HS2 is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under Section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

- monitoring the impact of construction works;
- to investigate complaints, incidents and exceedance of trigger levels; or
- monitoring the effectiveness of noise and vibration control measures.

1.1.2 Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the Buckinghamshire (BS) Local Authority area for the period 1st to 31st October 2020.

1.1.3 Active construction sites in the local authority area where monitoring was undertaken during this period include:

- Bottom House Farm Lane - BHFL (see plan 2 in Appendix A), where work activities included:
 - Earthworks activities including trial holes to uncover water pipes, stockpile management and topsoil stripping, compaction and membrane installation along the temporary access road within compound.
 - Site management activities including post and rail fencing and installation of Heras fencing.
 - Roadworks activities involving the construction of the compound's road access.
- Chalfont St Peter Vent Shaft - CSP (see plan 3 in Appendix A), where works activities included:
 - Structural wall installation works including diaphragm wall excavation, rebar and concreting and operation of vacuum truck and centrifuge.
 - Earthworks activities including borehole drilling, grout injection and stockpile management
- Load Test Pile 1 worksite - LTP #1 (see plan 4 in Appendix A), where works activities included:

- Ground Investigation (GI) and overwater investigation works
 - Earthworks and drainage works.
 - Construction of access roads and hardstanding.
 - Lay of track matt, temporary fencing and signage.
- Amersham Vent Shaft worksite – AM (see plan 5 in Appendix A), where works activities included:
 - Installation of services/machinery including site offices, storage, reinforcement, crane bases and workshops.
 - Utility and drainage works.
 - Car park finishes and traffic managements.
 - Quainton Access Road – QAR (see plan 6 in Appendix A) where works activities included:
 - Earthworks activities involving excavation of ponds, topsoil stripping, subsoil importation and compaction.
 - Construction of access roads and installation of geogrid.
 - Installation of protection slab for telecommunication utilities.

1.1.4 Further works, where monitoring did not take place, were also undertaken at:

- Ground investigation works to inform design and site mobilisation at various locations within the local authority area.
- Northmoor, Chalfont St. Giles and Amersham as part of water pipeline works.
- Frith Hill, Wendover, Aylesbury, Quainton, Mixbury, Calvert, Uxbridge and Turweston as part of electricity diversion works.
- Aylesbury, Quainton, Fulmer and Perry Hill as part of gas pipeline works.
- Great Missenden, West Street compound, Quainton, Calvert and Edgcott Road where compound set up, ground investigations and earthworks were underway.

1.1.5 The applicable standards, guidance, and monitoring methodology is outlined in the construction noise and vibration monitoring methodology report which can be found at the following location <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>. Noise and vibration monitoring reports for previous months can also be found at this location.

1.2 Measurement Locations

1.2.1 Seven noise monitoring installations were active in October in the BS area. Table 2 summarises the position of noise monitoring installations within the BS area in October 2020.

1.2.2 Maps showing the position of noise monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
CSP	CSP-NMP1	Chesham Lane, Chalfont St. Peter
	CSP-NMP2	Chesham Lane, Chalfont St. Peter
	CSP-NMP3	Chesham Lane, Chalfont St. Peter
LTP #1	LTP #1-NMP1	Along worksite northern boundary
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane
AM	AM-NMP1	Whielden Lane, Amersham
QAR	QAR-NMP1	1 Woodlands Farm Cottages

2 Summary of Results

2.1 Summary of Measured Noise Levels

2.1.1 Table 3 presents a summary of the measured noise levels at each monitoring location over the reporting period. The $L_{Aeq,T}$ is presented for each of the relevant time periods averaged over the calendar month, along with the highest single period $L_{Aeq,T}$ that was found to occur within the month.

Table 3: Summary of Measured dB L_{Aeq} Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average L _{Aeq,T} (Highest Day L _{Aeq,T})					Saturday Average L _{Aeq,T} (highest day L _{Aeq,T})					Sunday / Public Holiday Average L _{Aeq,T} (highest day L _{Aeq,T})	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
CSP	CSP-NMP1	Chesham Lane, Chalfont St. Peter	Free-field	64.3 (68.6)	66.4 (73.3)	62.9 (69.3)	61.1 (68.3)	59.5 (70.2)	62.5 (66.8)	63.4 (64.5)	61.1 (62.0)	60.5 (62.6)	59.1 (60.3)	59.9 (62.0)	59.3 (60.9)
	CSP-NMP2	Chesham Lane, Chalfont St. Peter	Free-field	47.4 (58.2)	50.5 (58.8)	44.9 (50.3)	43.4 (48.6)	39.8 (50.1)	45.3 (47.0)	49.1 (50.8)	47.5 (52.9)	48.1 (57.7)	39.0 (49.9)	48.8 (58.3)	38.4 (46.2)
	CSP-NMP3	Chesham Lane, Chalfont St. Peter	Free-field	57.5 (58.8)	57.2 (58.8)	56.6 (59.5)	54.2 (57.3)	49.7 (56.4)	54.6 (55.3)	57.8 (58.9)	58.3 (59.9)	56.8 (60.4)	49.8 (53.6)	56.4 (58.5)	49.7 (56.9)
LTP #1	LTP #1-NMP1	Along worksite northern boundary	Free-field	61.0 (64.6)	61.6 (70.3)	59.6 (64.9)	56.8 (63.8)	54.4 (63.3)	57.4 (59.5)	60.9 (63.0)	59.3 (62.4)	58.8 (62.4)	54.4 (56.8)	59.4 (62.4)	55.4 (63.2)
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane	Free-field	56.1 (64.1)	59.3 (65.1)	53.3 (58.5)	49.3 (53.2)	47.0 (55.2)	52.9 (55.5)	55.8 (57.7)	54.8 (57.8)	52.4 (57.5)	46.3 (52.0)	51.9 (55.8)	46.7 (54.3)
AM	AM-NMP1	Whielden Lane, Amersham	Free-field	70.9 (72.8)	73.4 (86.9)	70.3 (72.1)	67.5 (72.3)	62.6 (70.3)	67.5 (68.9)	70.6 (71.8)	70.9 (72.6)	69.1 (72.2)	62.1 (67.0)	69.5 (72.6)	62.0 (68.3)
QAR	QAR-NMP1	1 Woodlands Farm Cottages	Free-field	55.9 (64.2)	53.5 (58.3)	49.8 (57.4)	46.0 (51.3)	44.0 (53.8)	53.2 (58.1)	52.8 (56.4)	53.1 (56.5)	50.8 (59.0)	41.5 (52.4)	50.9 (57.5)	44.6 (61.2)

2.1.2 Appendix C presents graphs of the noise monitoring data over the month for each of the measurement locations. Noise data presented consists of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). The full data set for the monitoring equipment can be found at the following location:
<https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

2.2 Exceedances of the LOAEL and SOAEL

2.2.1 The lowest observed adverse effect level (LOAEL) is defined in the Planning Practice Guidance – Noise (PPG) as the level above which "noise starts to cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life".

2.2.2 The significant observed adverse effect level (SOAEL) is defined in the 'Planning Practice Guidance – Noise' as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

2.2.3 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the LOAELs and SOAELs for construction noise.

2.2.4 Where construction noise levels exceed the LOAEL and SOAEL relevant periods will be identified. Summary statistics to evaluate ongoing qualification for noise insulation and temporary rehousing are also presented where relevant.

2.2.5 Table 4 presents a summary of recorded exceedances of the LOAEL and SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 4: Summary of Exceedances of LOAEL and SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of LOAEL	Number of exceedances of SOAEL
CSP	CSP-NMP1	Chesham Lane, Chalfont St. Peter	All days Night	0700-2200 2200-0700	Continuous Continuous	No exceedance Continuous*
	CSP-NMP2	Chesham Lane, Chalfont St. Peter	All days	All periods	No exceedance	No exceedance
	CSP-NMP3	Chesham Lane, Chalfont St. Peter	All days	All periods	No exceedance	No exceedance
LTP #1	LTP #1-NMP1	Along worksite northern boundary	Weekday	0800-1800	1	No exceedance
BHFL	BHFL-NMP1	Elm Tree Cottage, Bottom House Farm Lane	Weekday	0800-1800	1	No exceedance
AM	AM-NMP1	Whielden Lane, Amersham	Weekday Saturdays	0800-1800 0800-1300	22 5	7** No exceedance
QAR	QAR-NMP1	1 Woodlands Farm Cottages	All days	All periods	No exceedance	No exceedance

* Exceedances of the SOAEL at monitoring position CSP-NMP1 were due to a generator installed 5m from the monitor. Therefore, in consideration of the large separation distance between the monitor and nearby receptors (approximately 70m), noise levels at receptor locations are calculated to be below the SOAEL.

** Exceedances of the SOAEL at monitoring position AM-NMP1 were due to construction activities being undertaken in close proximity to the monitor. In consideration of the large separation distance between the monitor and nearby receptors (approximately 70m), noise levels at receptor locations are calculated to be below the SOAEL.

2.2.6 No exceedances of the SOAEL at sensitive receptors were recorded due to HS2 construction works during October 2020. A number of exceedances of the LOAEL were recorded at monitoring positions CSP-NMP1, LTP #1-NMP1, BHFL-NMP1 and AM-NMP1 in October 2020.

2.3 Exceedances of Trigger Level

2.3.1 Table 5 provides a summary of exceedances of the S61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 5: Summary of Exceedances of Trigger Levels

Complaint Reference Number (if applicable)	Worksite Reference	Date and Time Period	Identified Source	Results of Investigation (including noise monitoring results)	Actions Taken
-	-	-	-	-	-

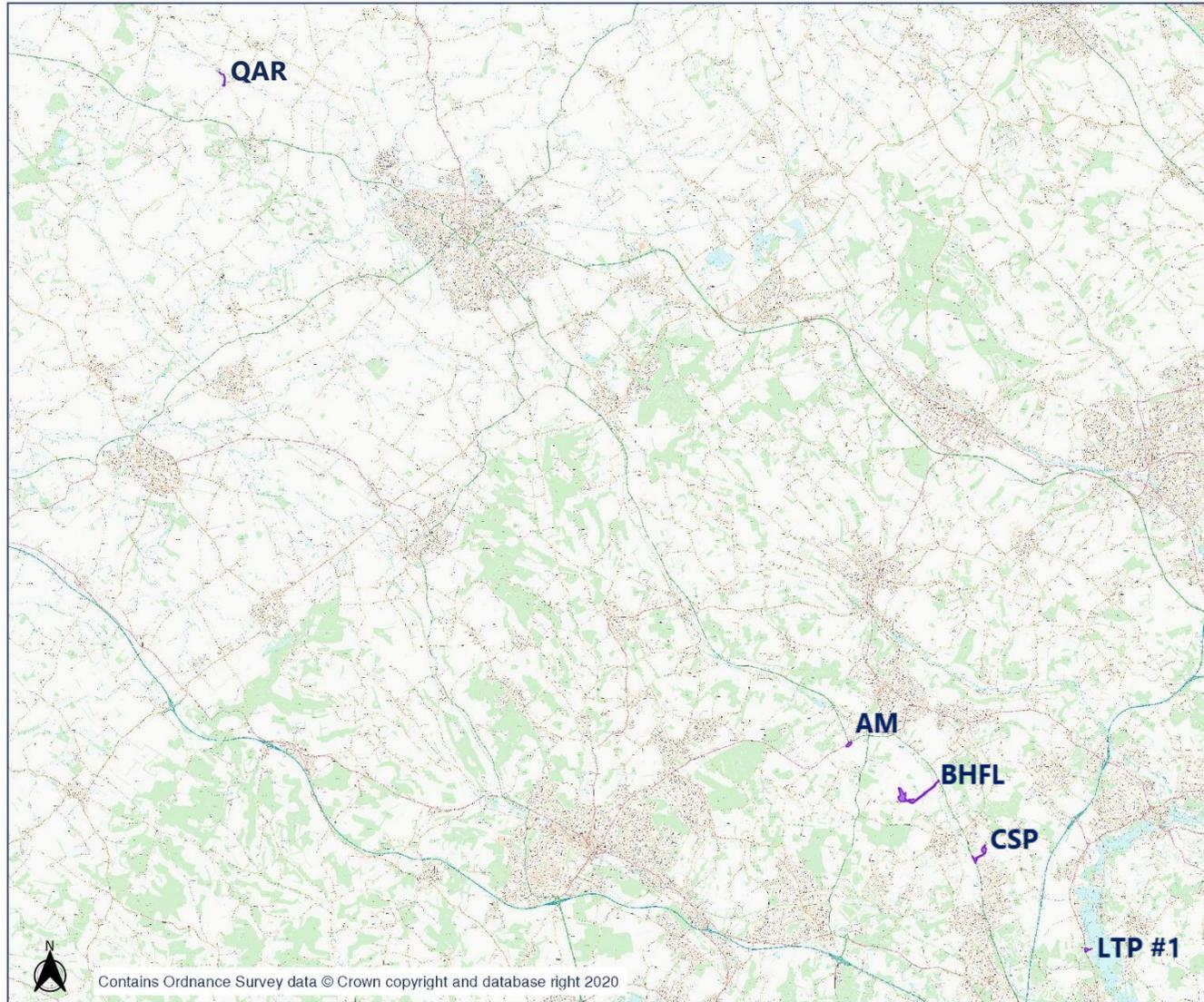
2.4 Complaints

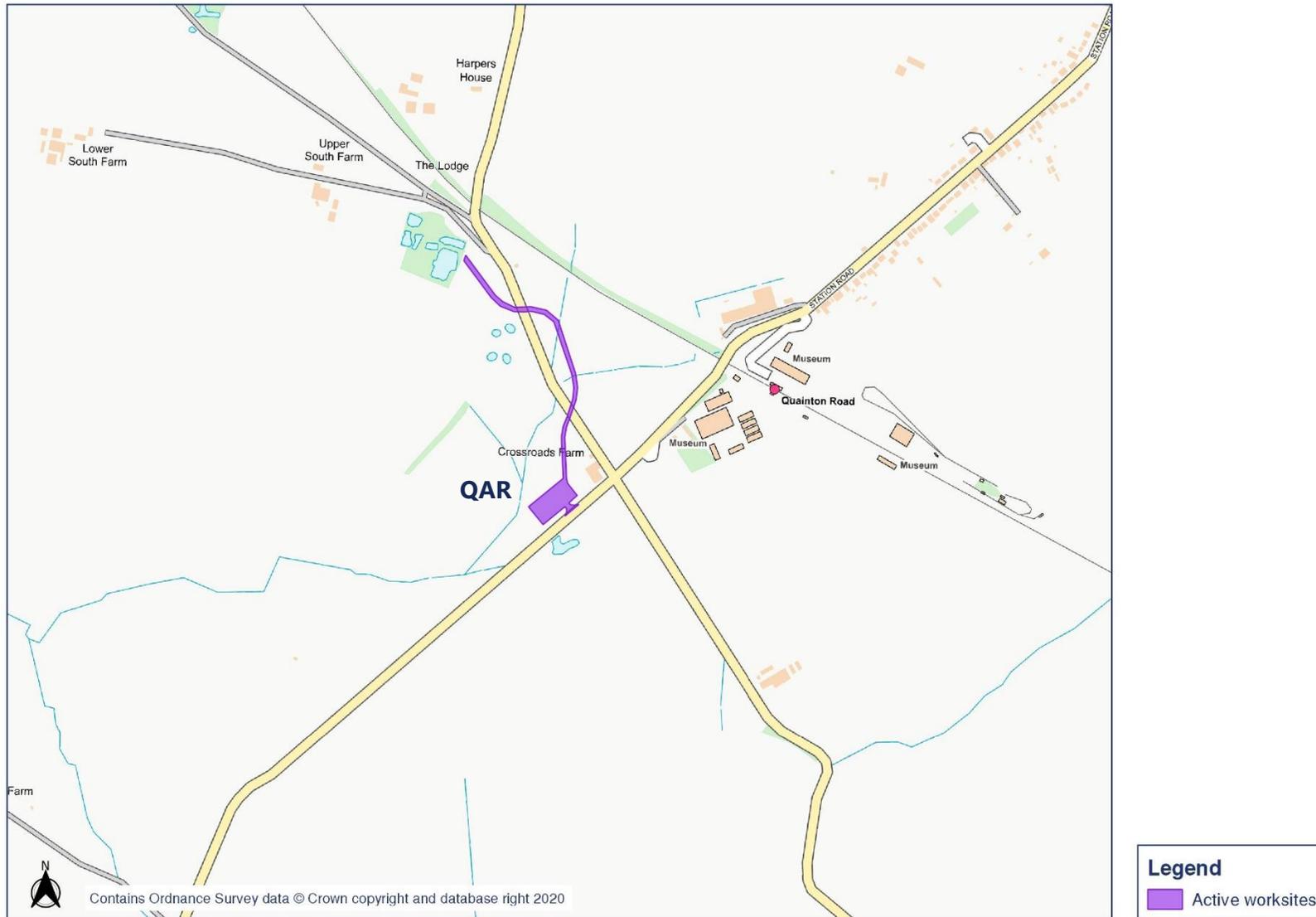
2.4.1 Table 6 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

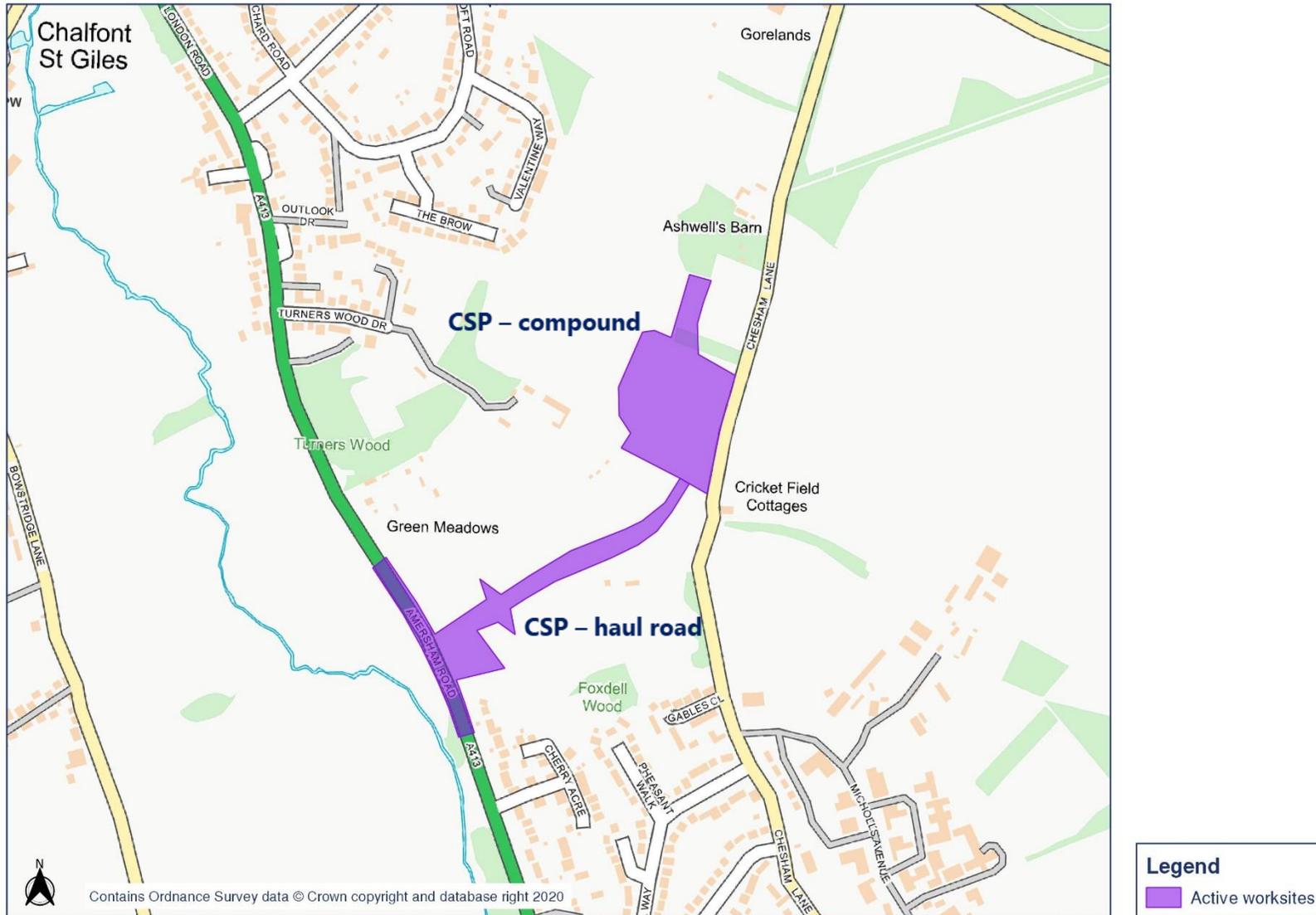
Table 6: Summary of Complaints

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-20-40755-C	-	Noise and vibration from HGVs and possible damage to properties through this.	3no. vehicles identified in particular by stakeholder were found not to be connected to HS2 work.	Confirmed the information to stakeholder. Also advised stakeholder that the impacts of noise and vibration due to any HS2 works were assessed within the planning stages and are available to view (link provided). Also confirmed contractor has undertaken more recent assessments of the area and have not found that there are any properties that exceed trigger level for noise insulation. Confirmed further assessments will be undertaken.

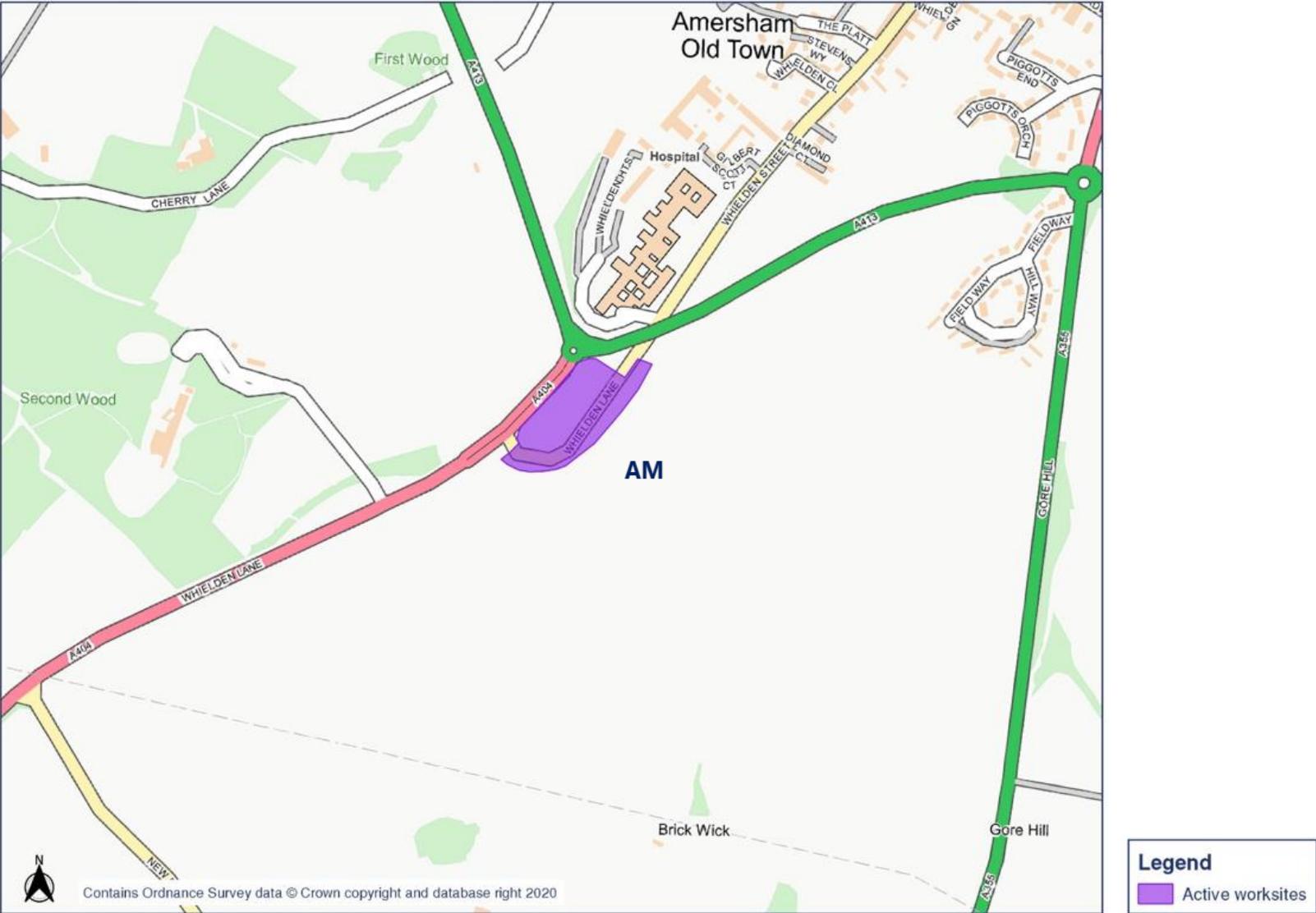
Appendix A Site Locations



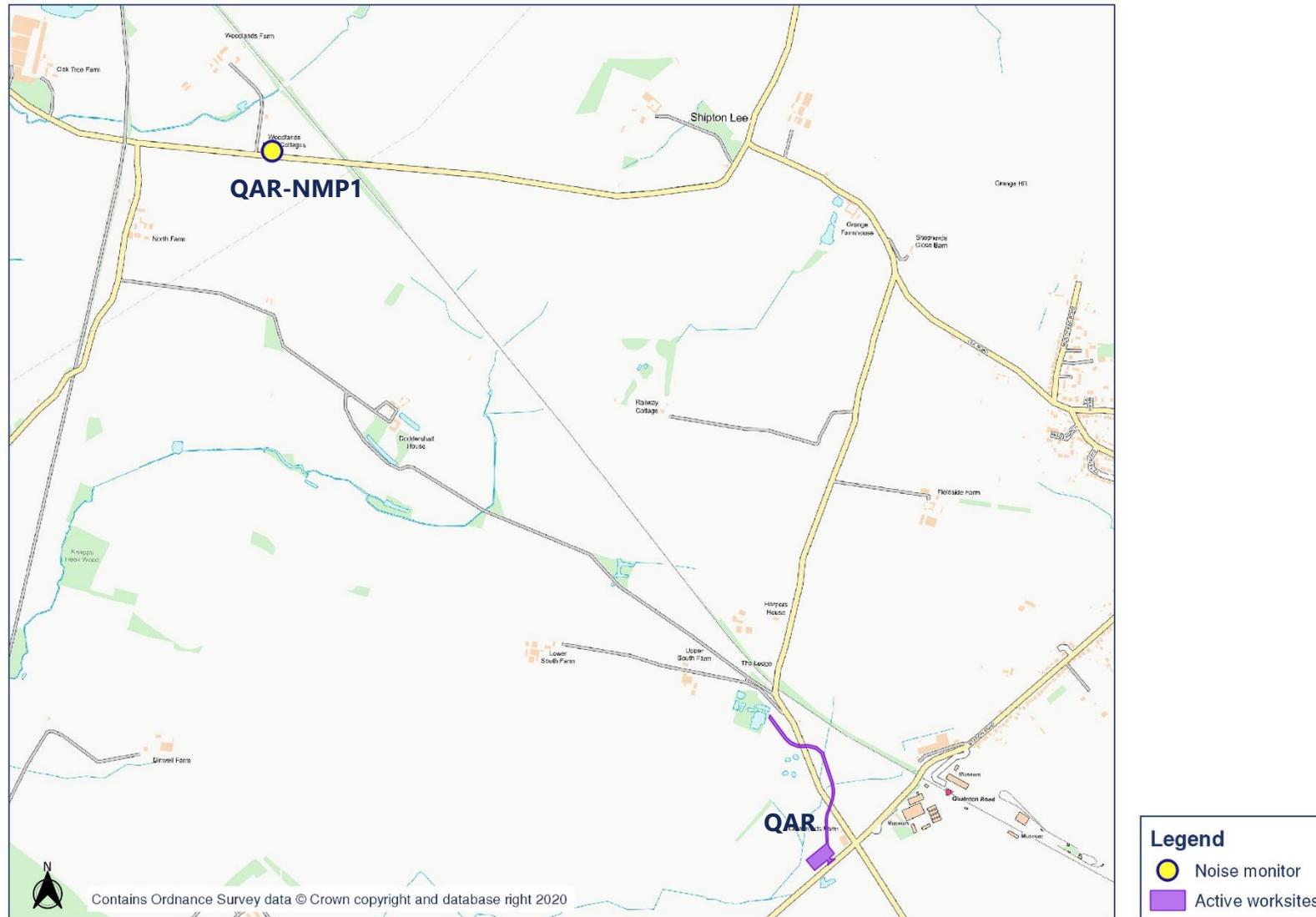


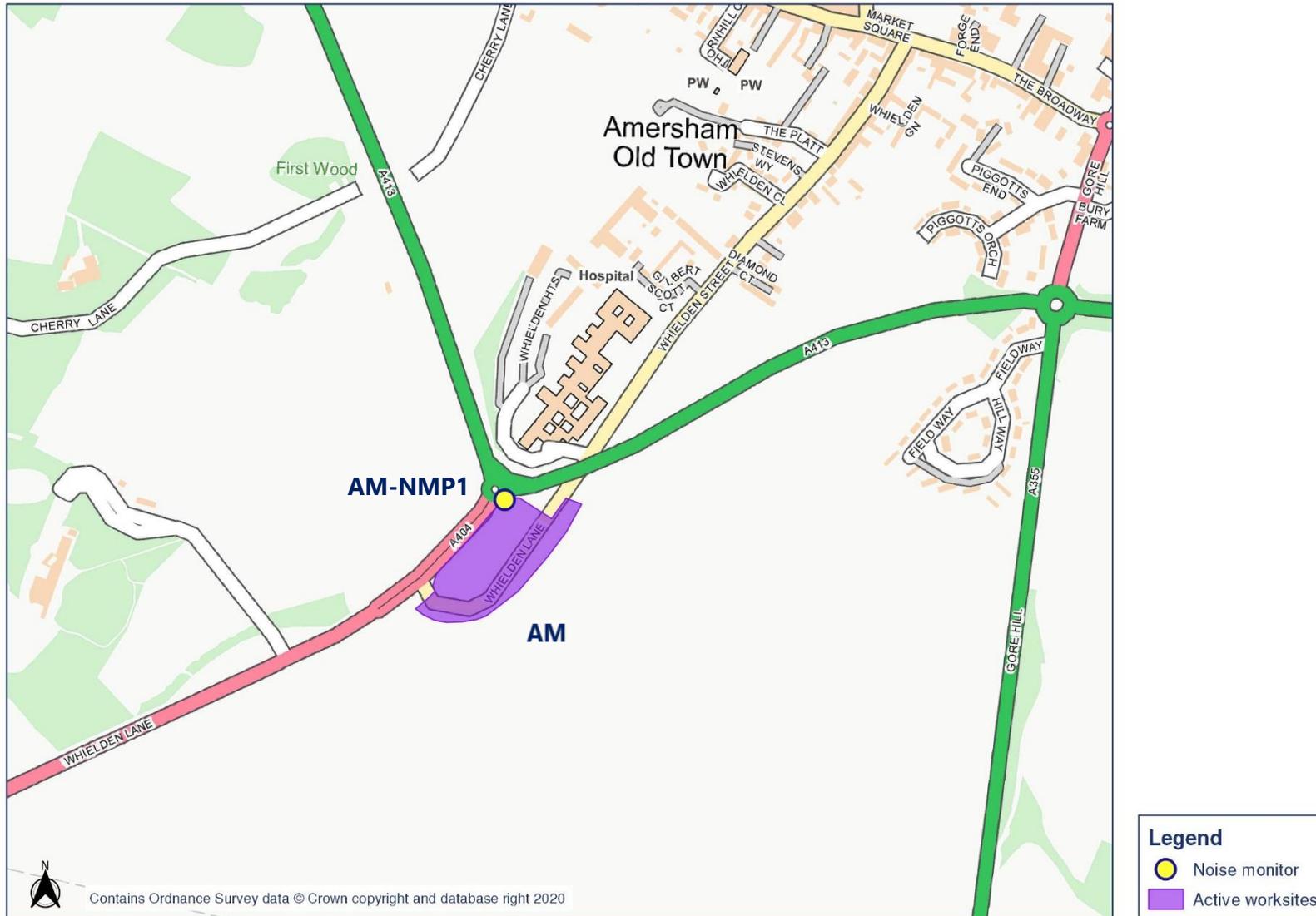


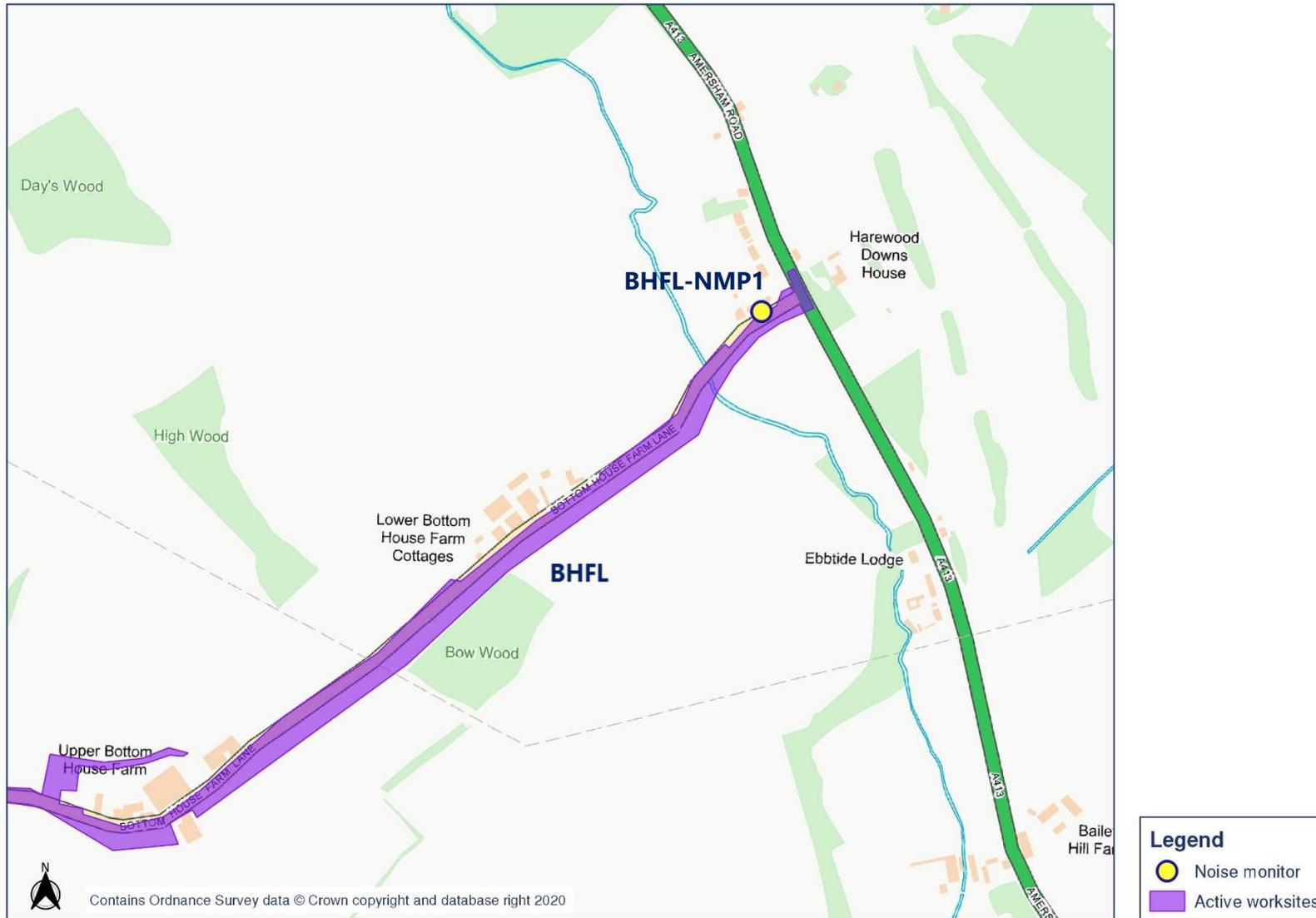


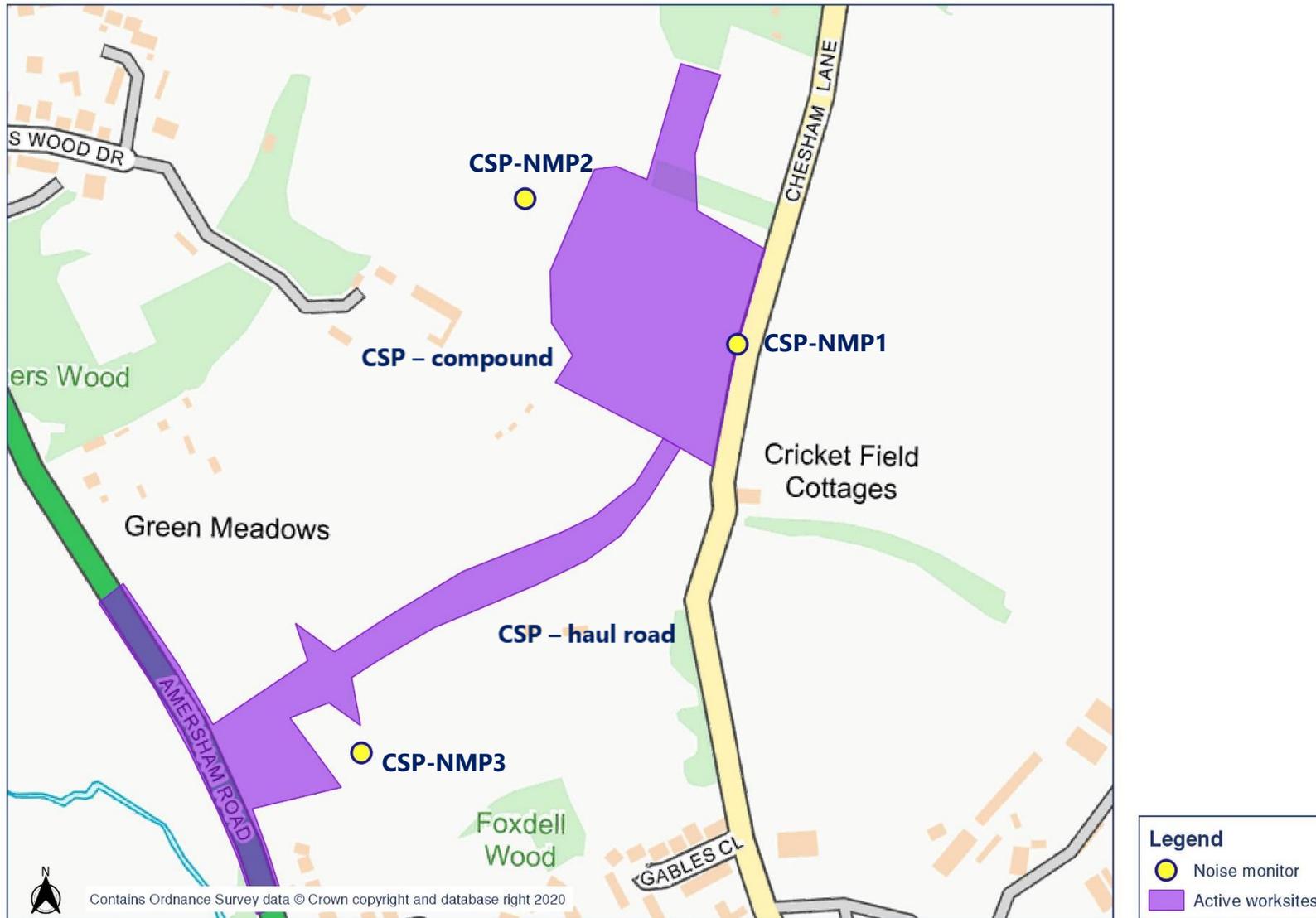


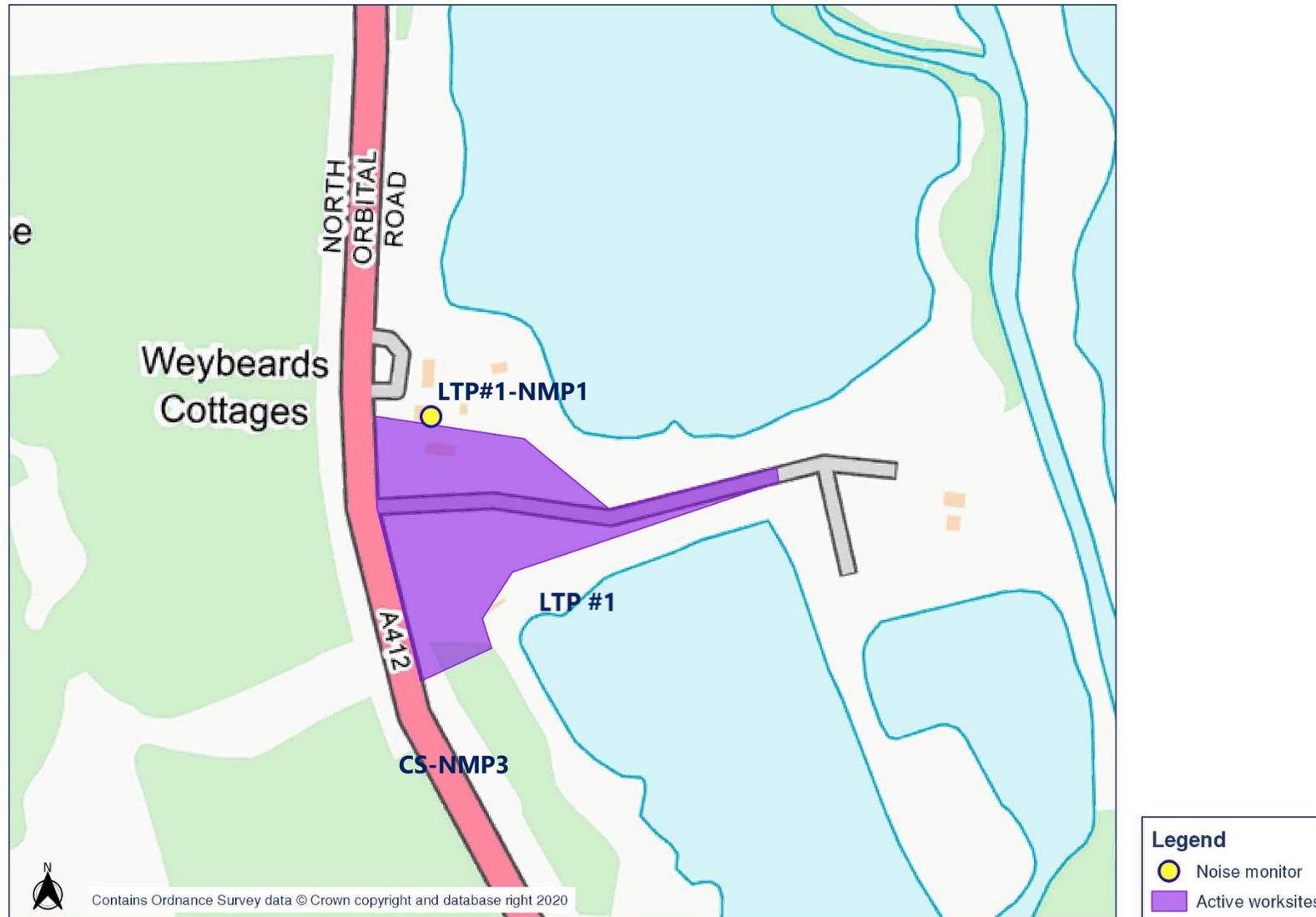
Appendix B Monitoring Locations







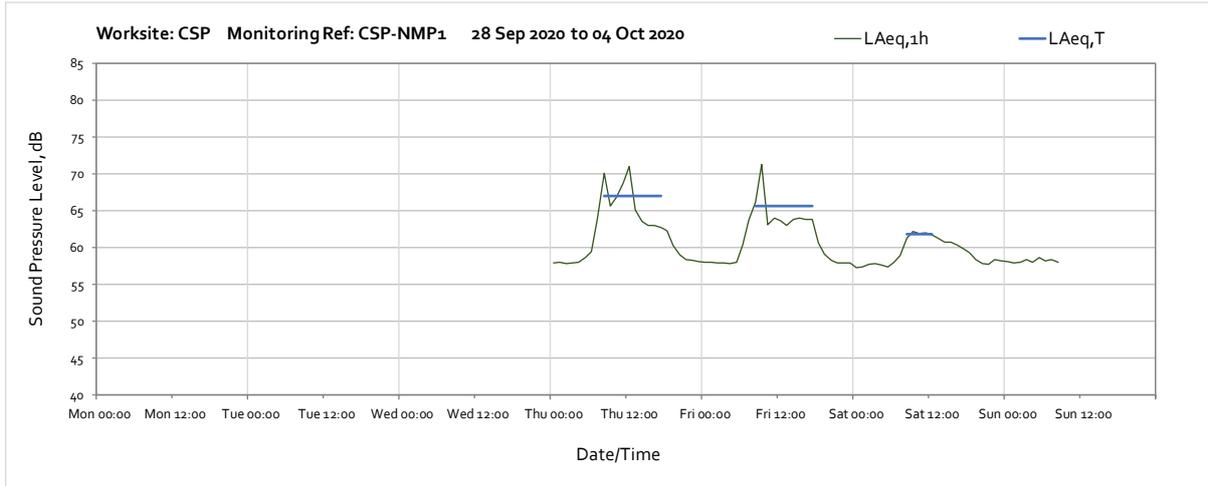




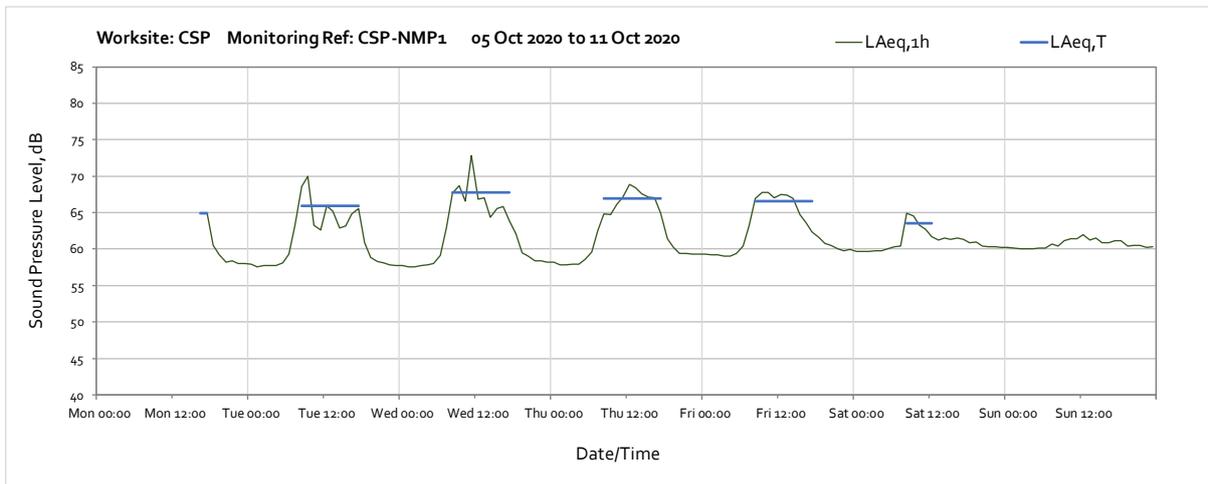
Appendix C Data

The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the $L_{Aeq,T}$ values in Table 3 of the main report.

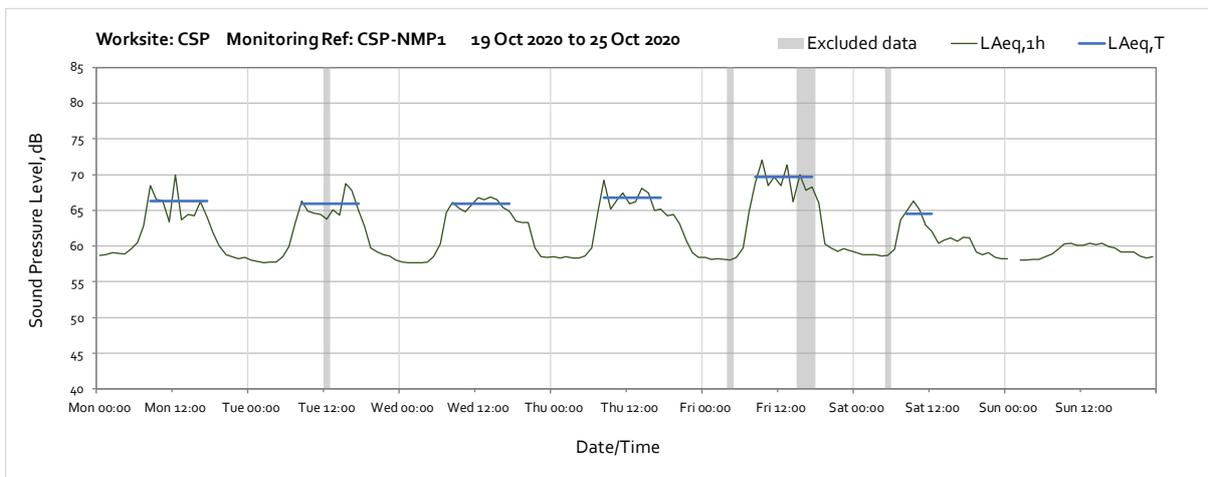
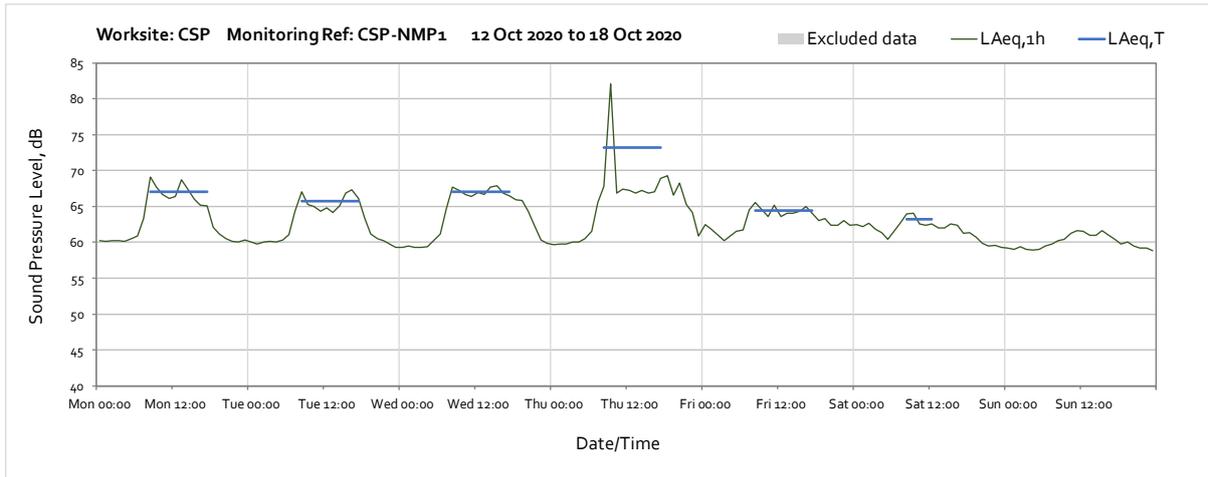
Worksite: CSP – Monitoring Ref: CSP-NMP1



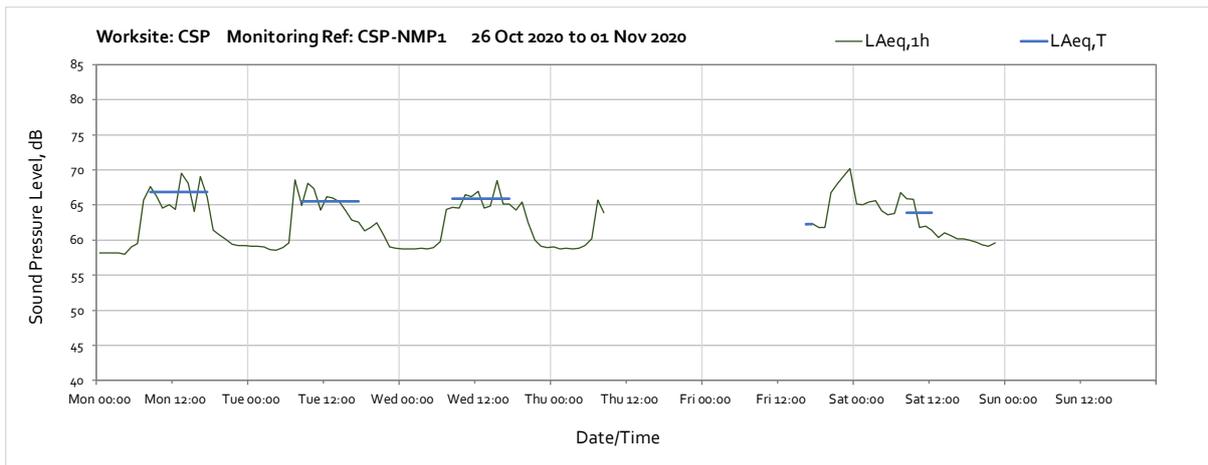
Note: Missing data between 09:00 on Sunday 04th October and 16:00 on Monday 05th October was due to loss of continuous site power.



Note: Missing data between 09:00 on Sunday 04th October and 16:00 on Monday 05th October was due to loss of continuous site power.

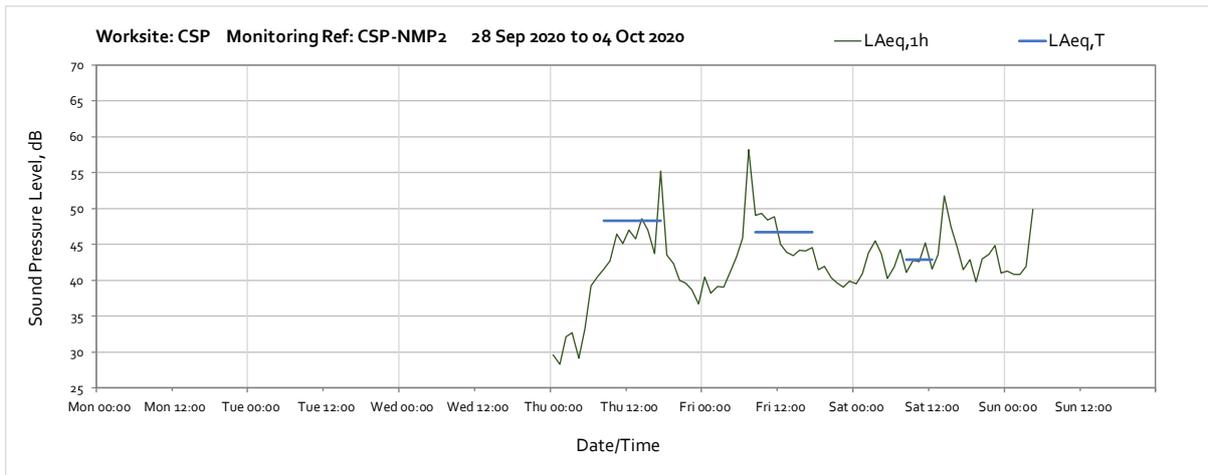


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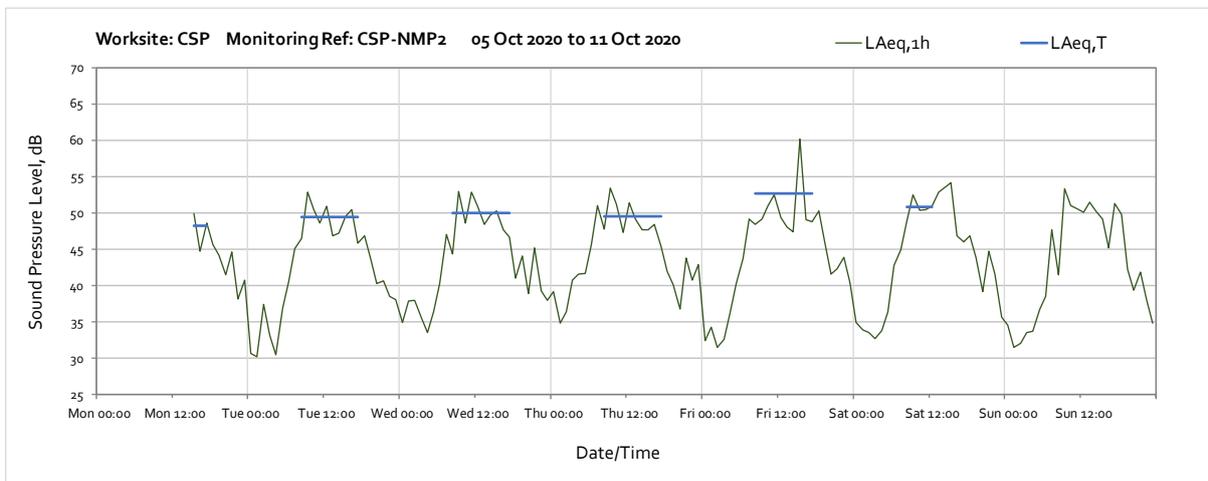


Note: Missing data between 09:00 on Thursday 29th October - 16:00 on Friday 30th and between 23:00 on Saturday 31st October - 00:00 on 01st November was due to loss of continuous site power.

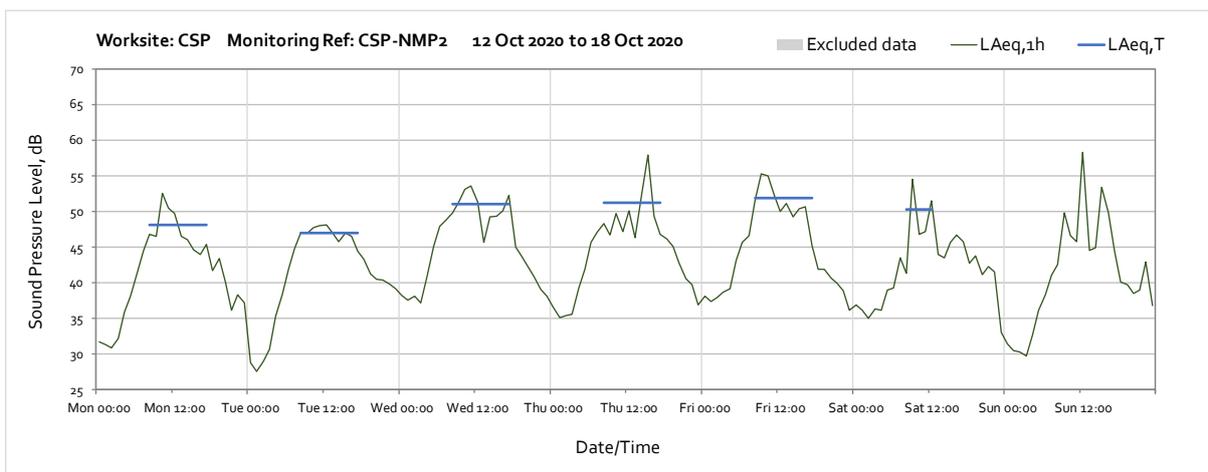
Worksite: CSP – Monitoring Ref: CSP-NMP2

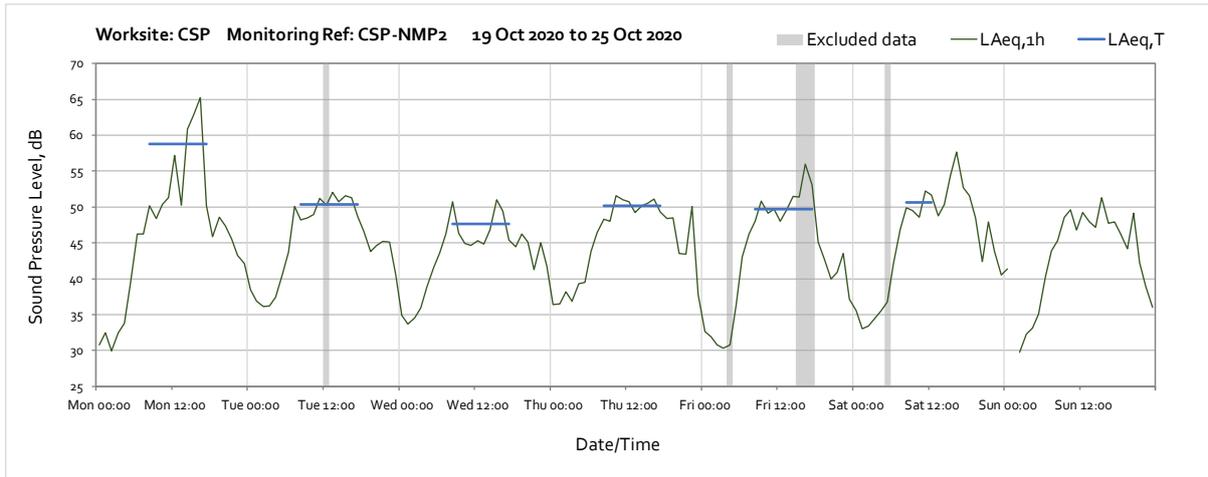


Note: Missing data between 05:00 on Sunday 04th October and 15:00 on Monday 05th October was due to failure of remote connection of the noise monitor.

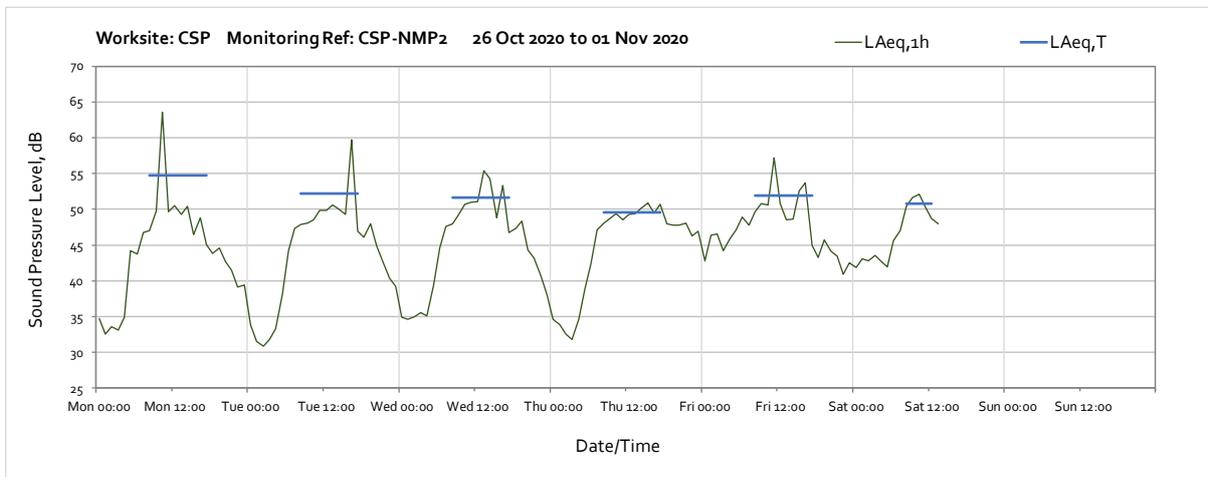


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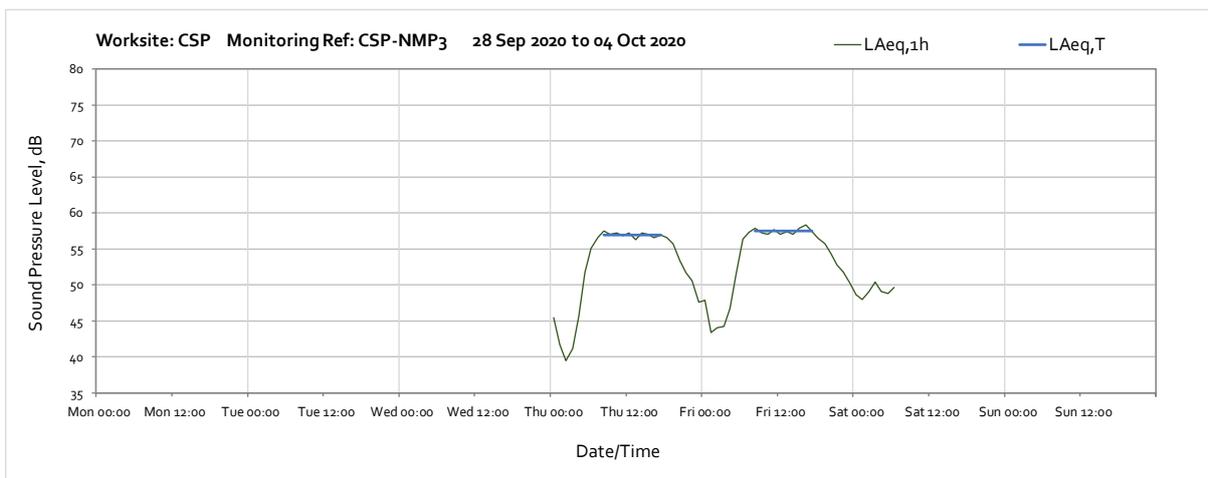


Note: Missing data between 01:00 on Sunday 25th October and 02:00 on Sunday 25th October was due to clock change.



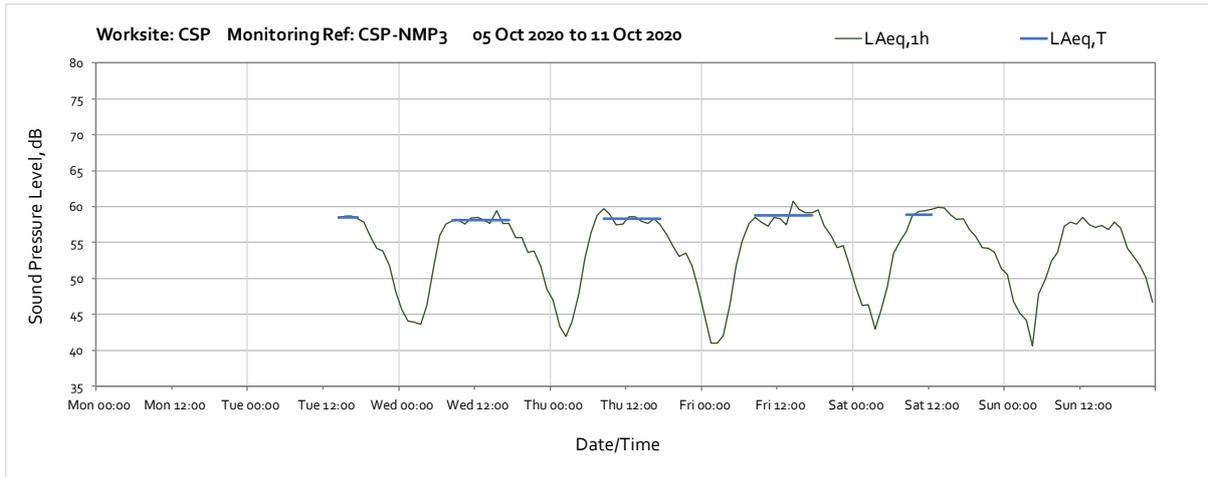
Note: Missing data between 14:00 on Saturday 31st October and 00:00 on Sunday 1st November was due to the loss of solar power caused by a lack of sunlight.

Worksite: CSP – Monitoring Ref: CSP-NMP3

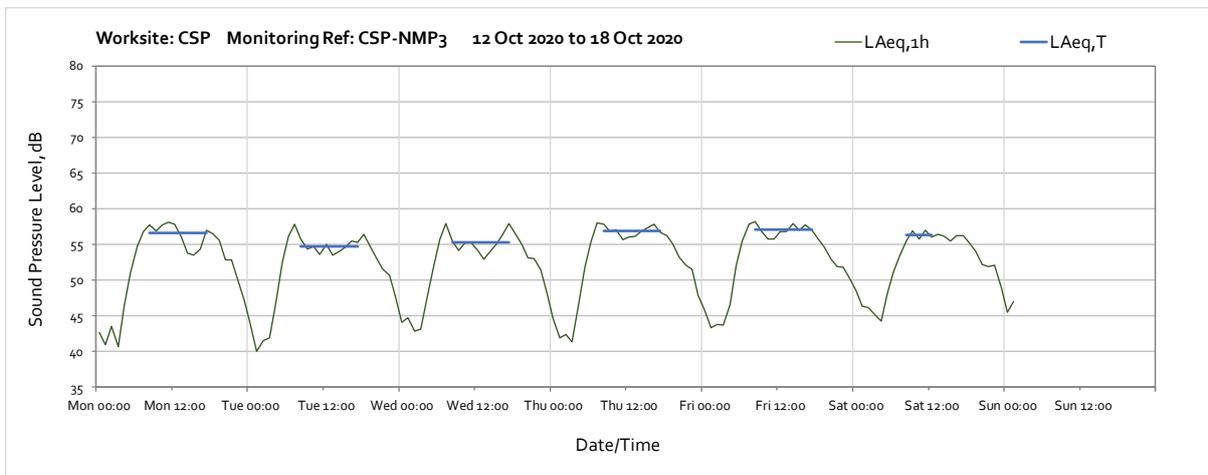


Note: Missing data between 07:00 on Saturday 03rd October and 14:00 on Tuesday 06th October was due to the loss of solar power caused by a lack of sunlight.

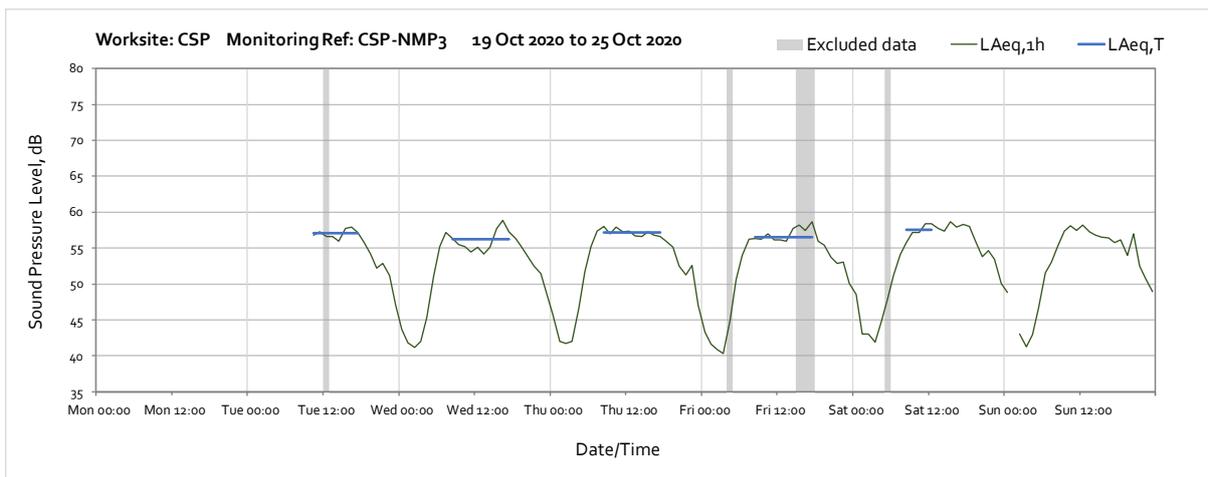
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Note: Missing data between 06:00 on Saturday 03rd October and 14:00 on Tuesday 06th October was due to the loss of solar power caused by a lack of sunlight.

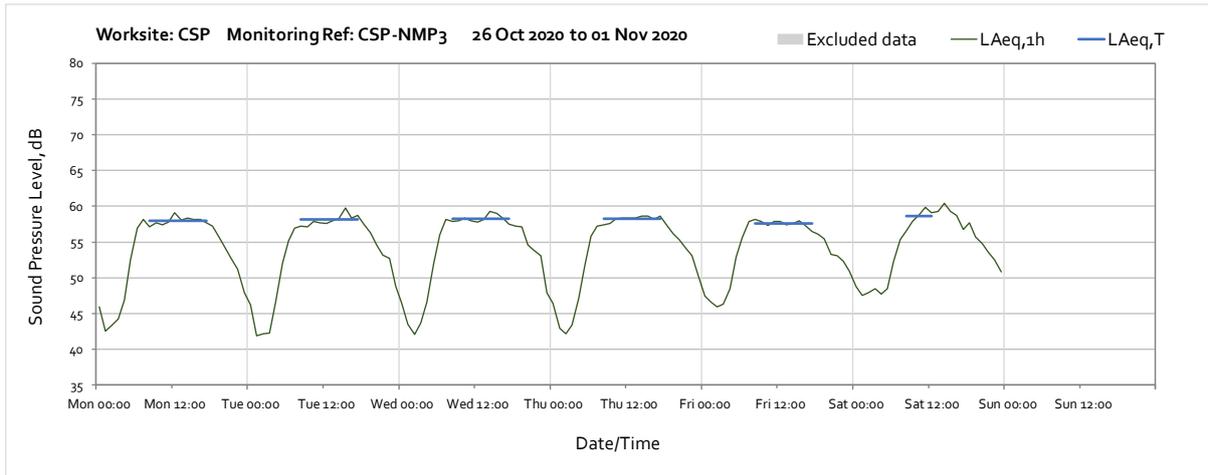


Note: Missing data between 02:00 on Sunday 18th October and 10:00 on Tuesday 20th October was due to the loss of solar power caused by a lack of sunlight.

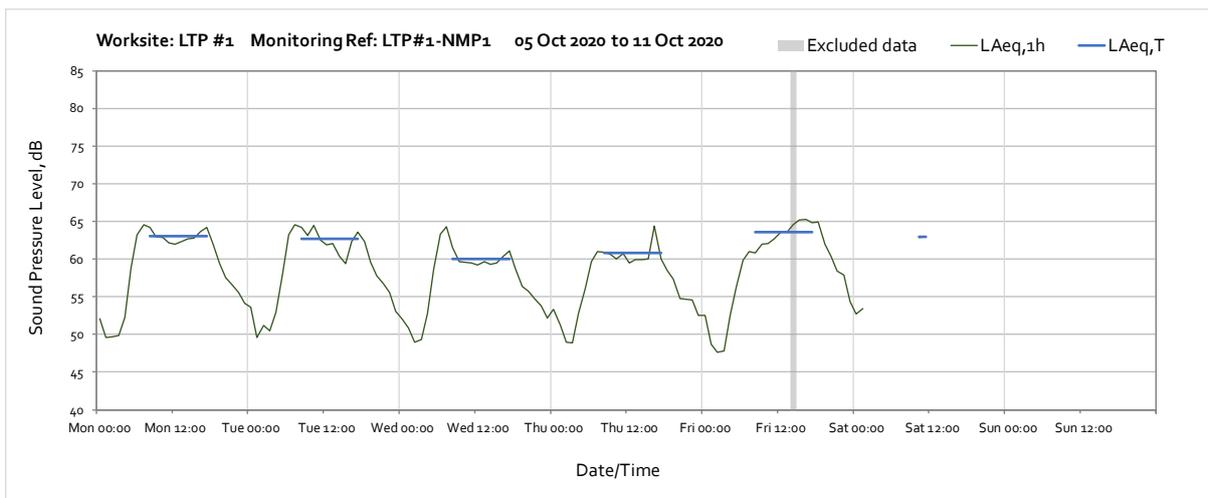
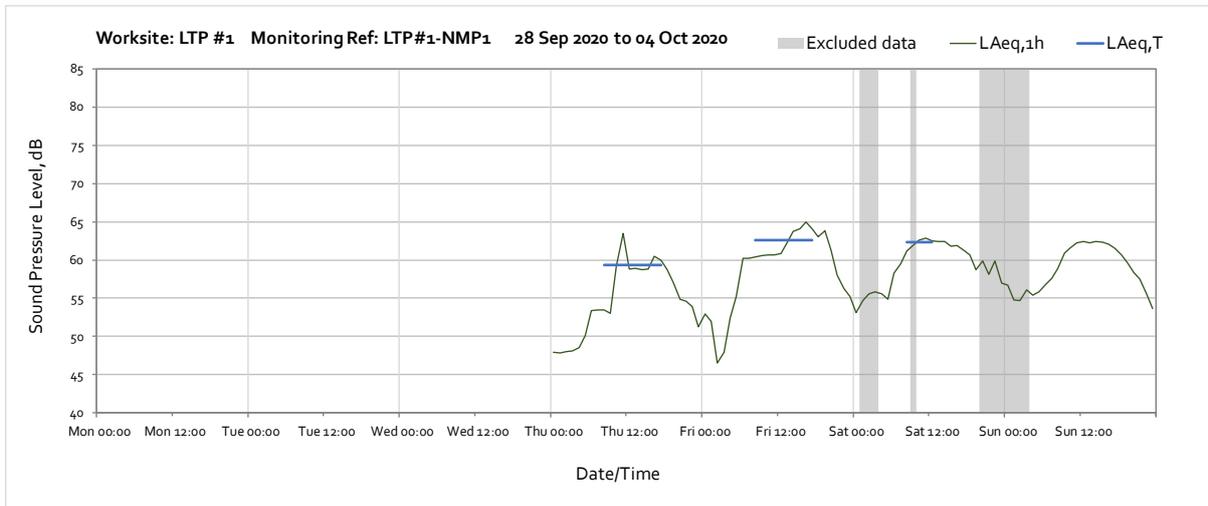


Note: Missing data between 02:00 on Sunday 18th October and 10:00 on Tuesday 20th October was due to the loss of solar power caused by a lack of sunlight. Missing data between 00:00 on Sunday 25th October and 01:00 on Sunday 25th October was due to clock change.

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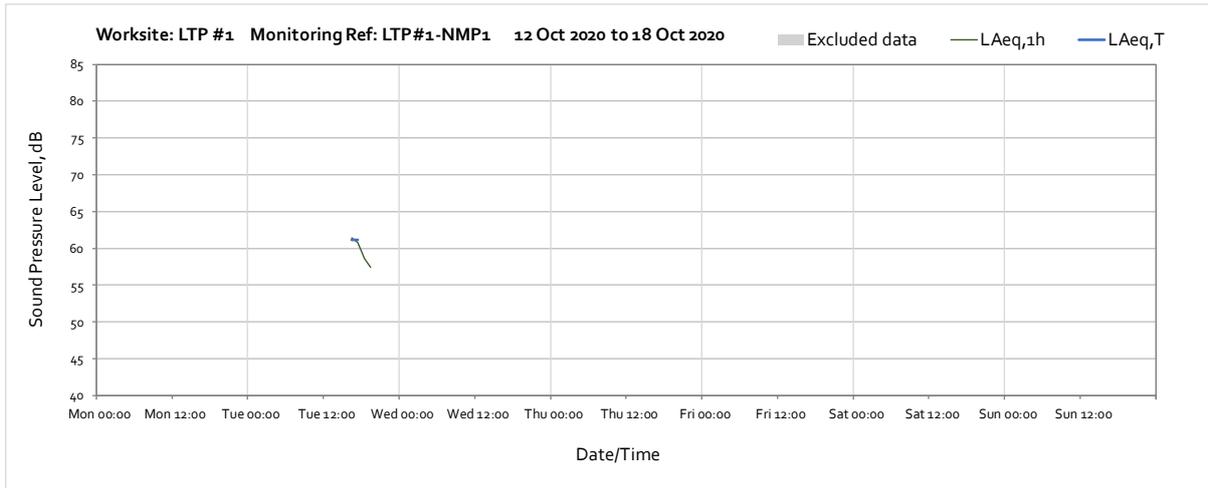


Worksite: LPT#1 – Monitoring Ref: LPT#1-NMP1

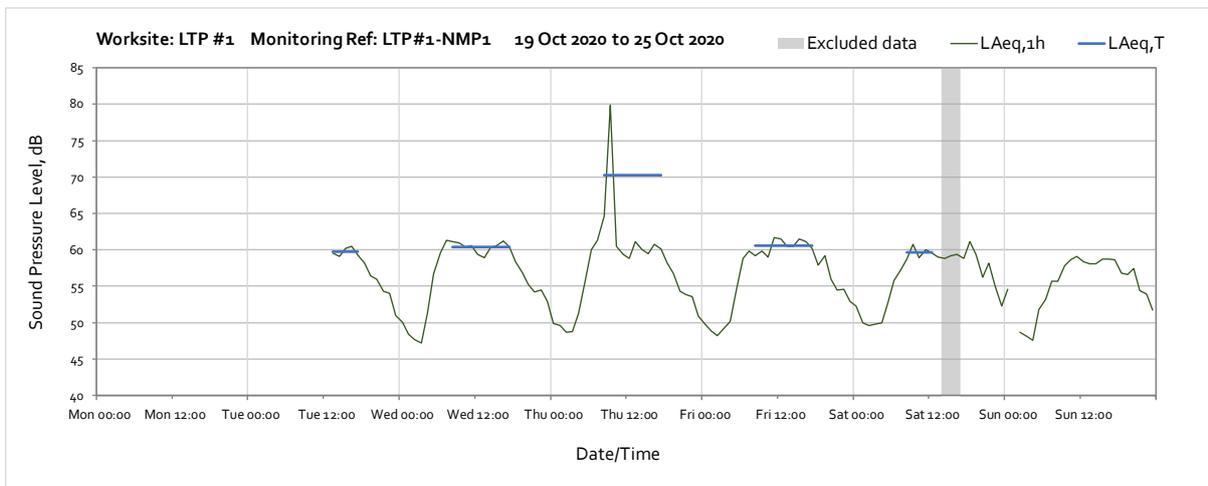


Note: Missing data between 02:00 and 10:00 on Saturday 10th October and between 12:00 on Saturday 10th October and 16:00 on Tuesday 13th October was due to loss of continuous site power.

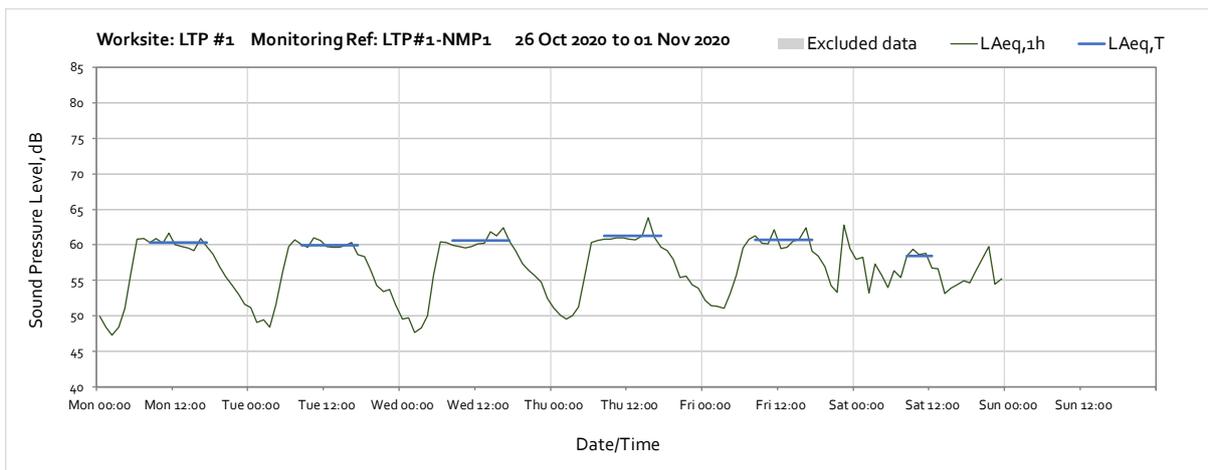
OFFICIAL



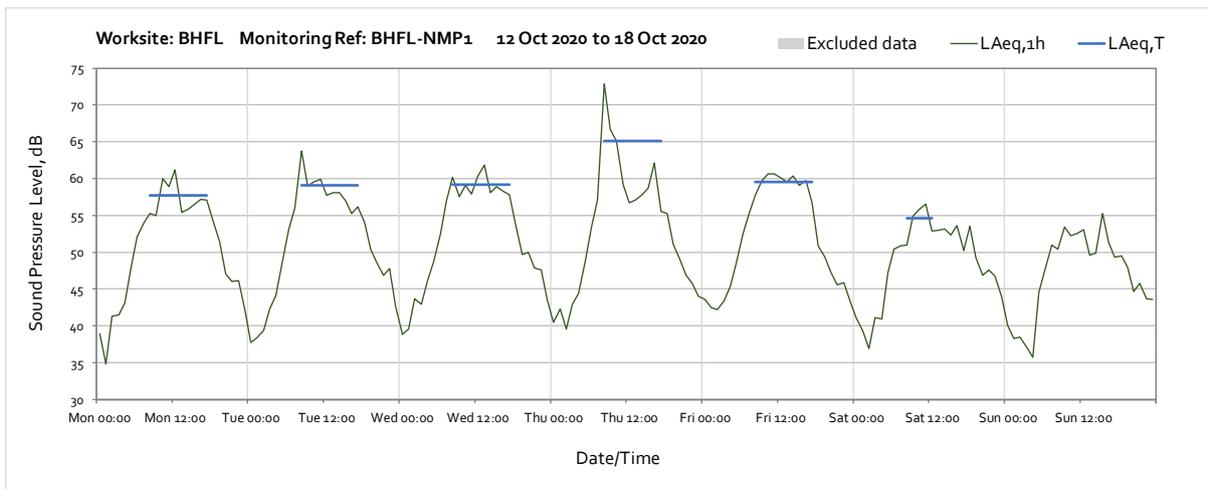
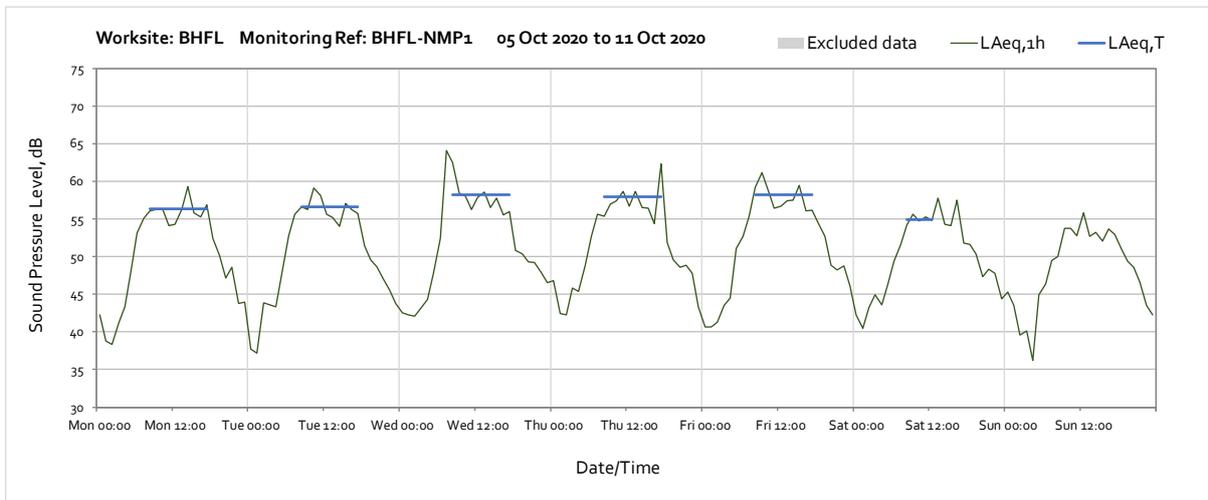
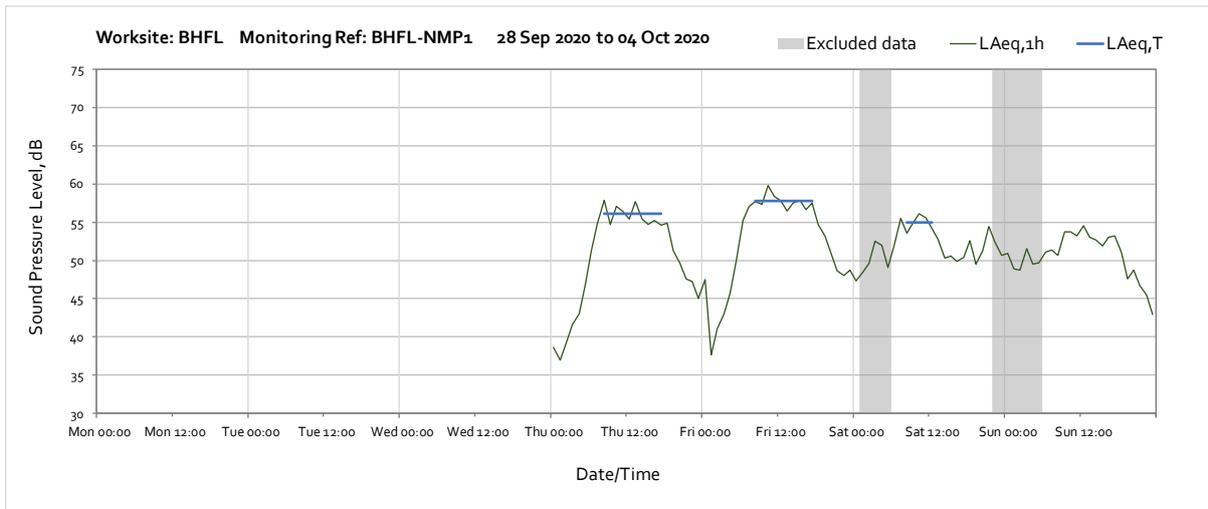
Note: Missing data between 12:00 on Saturday 10th October - 16:00 on Tuesday 13th October and between 20:00 on Tuesday 13th October - 13:00 on Tuesday 20th October was due to loss of continuous site power.



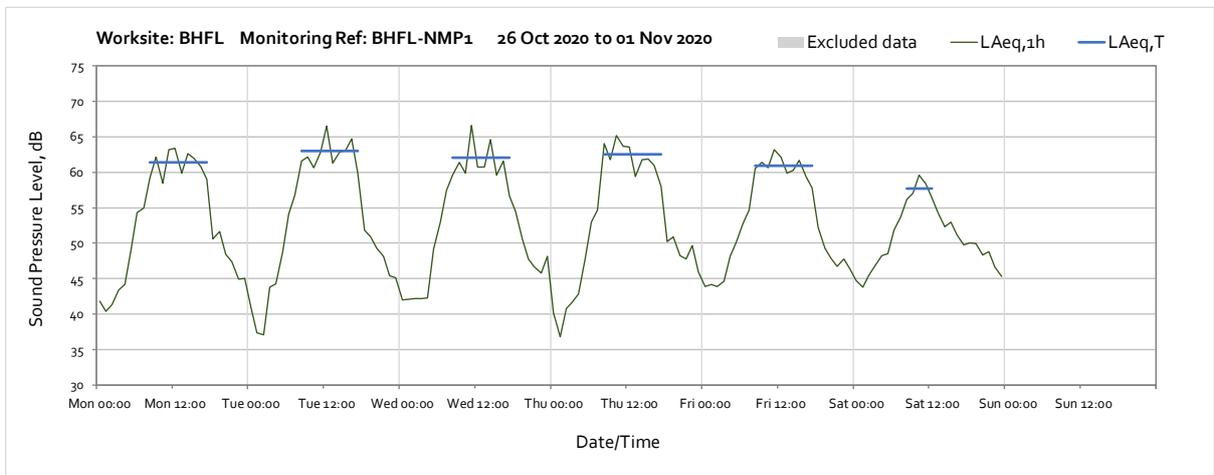
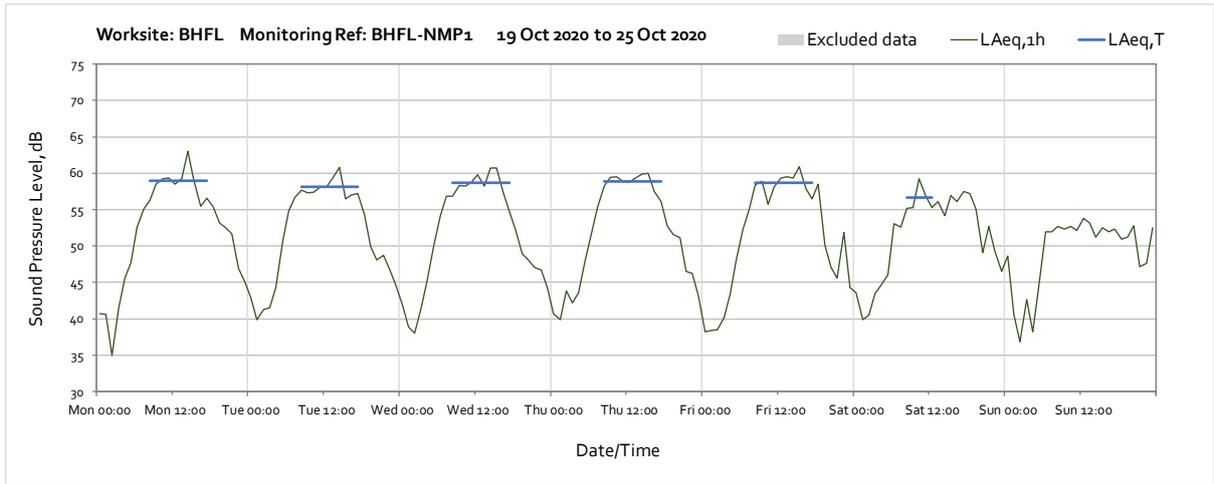
Note: Missing data between 20:00 on Tuesday 13th October and 13:00 on Tuesday 20th October was due to loss of continuous site power. Missing data between 01:00 on Sunday 25th October and 02:00 on Sunday 25th October was due to clock change.



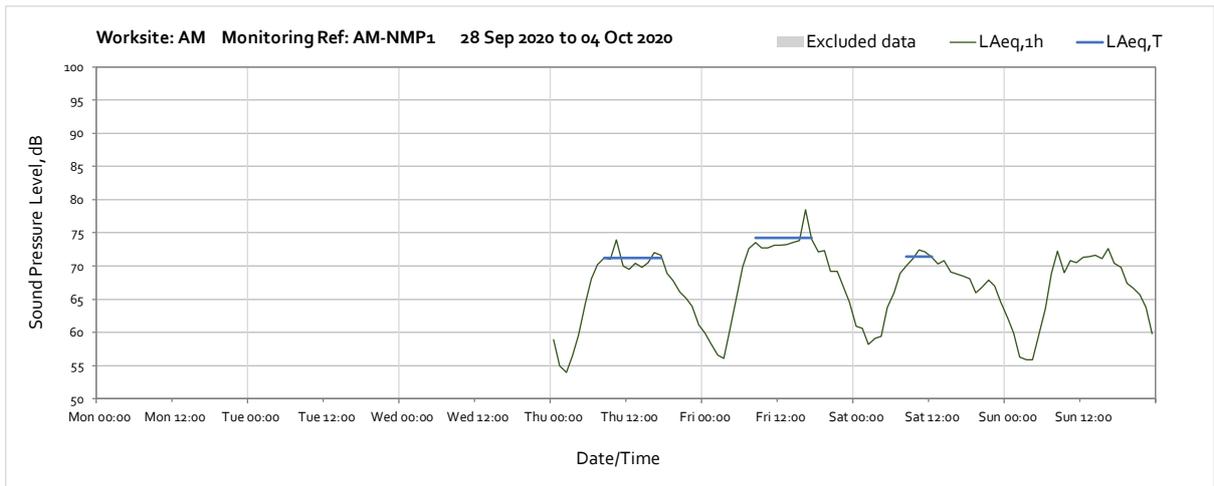
Worksite: BHFL – Monitoring Ref: BHFL-NMP1

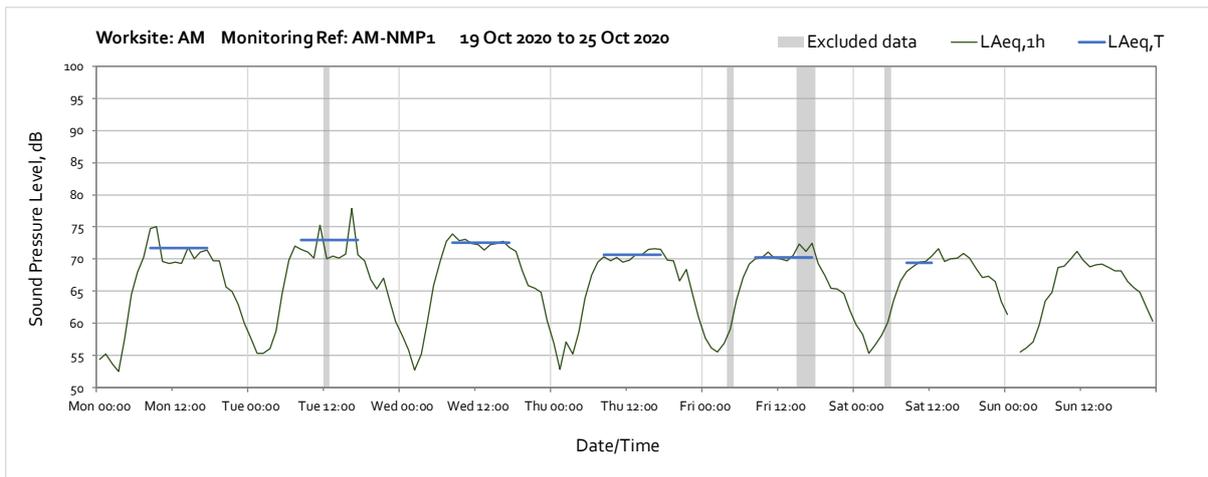
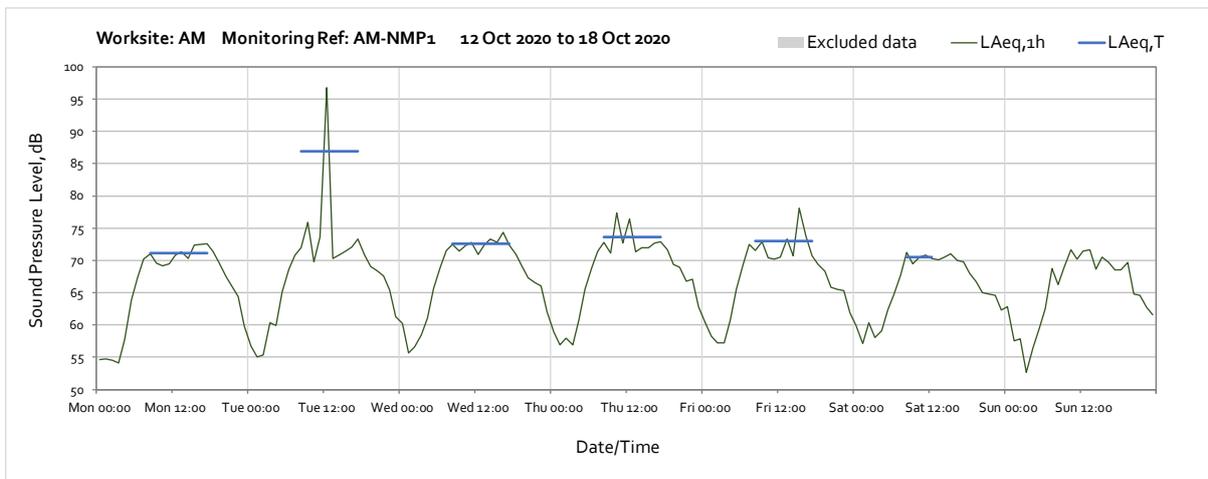
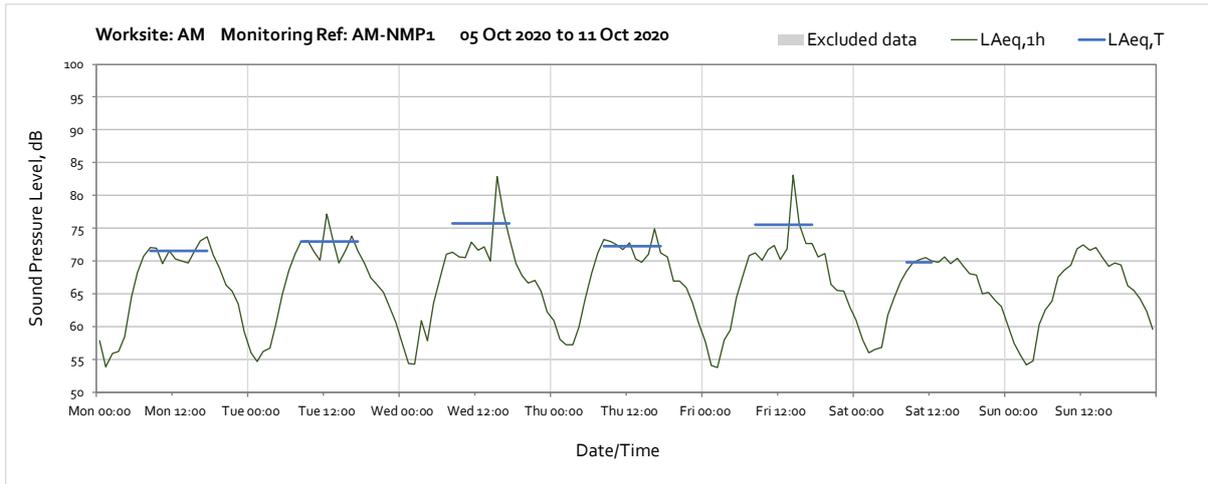


OFFICIAL

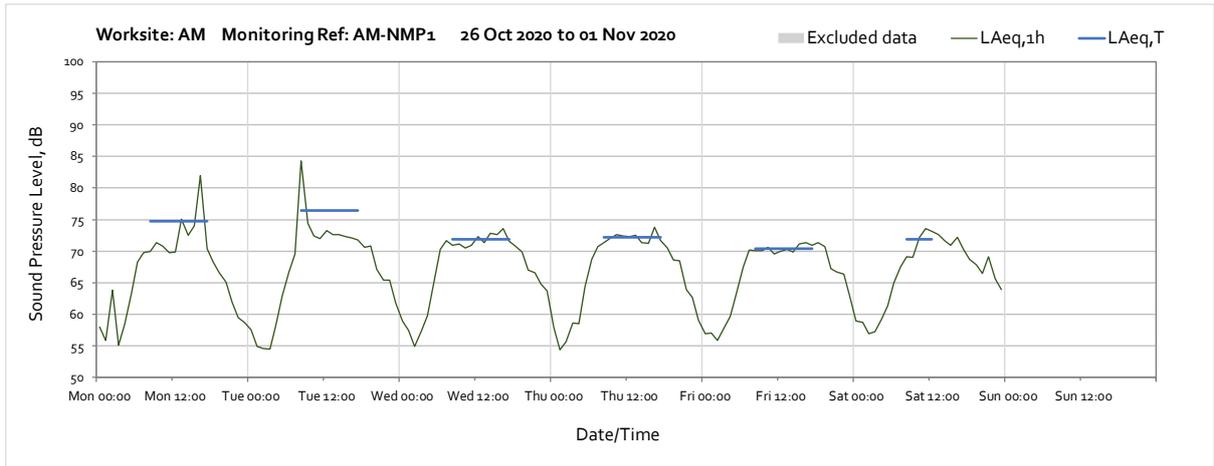


Worksite: AM – Monitoring Ref: AM-NMP1





Note: Missing data between 01:00 on Sunday 25th October and 02:00 on Sunday 25th October was due to clock change.



Worksite: QAR – Monitoring Ref: QAR-NMP1

